

REMARKS

The final Office Action of January 23, 2007, has been received and reviewed.

Claims 1-29 are currently pending and under consideration in the above-referenced application, each standing rejected.

Reconsideration of the above-referenced application is respectfully requested.

Rejections under 35 U.S.C. § 102

Claims 1-8 and 19-29 stand rejected under 35 U.S.C. § 102(e) for reciting subject matter which is purportedly anticipated by that described in U.S. Patent Publication 2003/0171456 to Tong et al. (hereinafter "Tong").

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single reference which qualifies as prior art under 35 U.S.C. § 102. *Verdegaal Brothers v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The identical invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

With respect to inherency, M.P.E.P. § 2112 provides:

The fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish inherency of that result or characteristic. *In re Rijckaert*, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993) . . . 'To establish inherency, the extrinsic evidence 'must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill . . . ' *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1991).

Tong describes a cureable underfill encapsulant material for application on semiconductor wafers. *See, e.g.*, paragraph [0013]. The encapsulant material described by Tong is a B-stageable composition made up of one or more epoxy resins, an imidazole-anhydride adduct and at least one solvent. *See, e.g., id.* Tong describes applying and initially curing the encapsulant material on a semiconductor wafer. *See, e.g., id.* The temperature and length of the initial cure are important, as they must be tailored to prevent overcuring of the B-stageable

composition. Paragraphs [0031] through [0032]. The glass transition temperature (T_g) of the B-stageable material is also very important, as it must be tailored to facilitate clean dicing of the material once the material has been partially cured, or “B-staged.” Paragraph [0033]; TABLE 4. Tong notes that a B-staged material that is “cleanly diced” does not stick to a wafer saw and has no cracks. Paragraph [0033].

Tong also describes a final cure performed on the encapsulant material after formation of interconnections by solder reflow. *See, e.g.*, paragraphs [0010] and [0013].

Independent claim 1 recites a method of forming a protective layer on a plurality of semiconductor device components. The method of independent claim 1 includes, among other things, healing cracks and delaminated areas in the protective material that formed as the components were severed.

It is respectfully submitted that Tong does not expressly or inherently describe healing cracks and delaminations produced during semiconductor dicing. Rather, Tong teaches in paragraph [0033] that the B-stageable material is formulated so as to have a glass transition temperature that allows it to be “cleanly diced” once the material has been B-staged; *i.e.*, that the material will not stick to the dicing saw or crack when sawed. A “cleanly diced” B-staged material would, therefore, include no cracks. As such, no healing of the B-staged material of Tong could occur.

Moreover, it is respectfully submitted that Tong does not describe circumstances in which healing would occur, or conditions in which healing would inherently occur.

Because Tong does not expressly or inherently describe healing cracks and delaminated areas in a protective material, Tong does not anticipate each and every element of independent claim 1. Therefore, it is respectfully submitted that, under 35 U.S.C. § 102(e), independent claim 1 recites subject matter which is allowable over that described in Tong.

Each of claims 2-8 and 19-29 is allowable, among other reasons, for depending either directly or indirectly from claim 1, which is allowable.

Claim 5 depends from claim 2 and is further allowable as Tong does not expressly or inherently describe providing a fabrication substrate with each of the plurality of semiconductor device components having a conductive structure protruding from the at least one bond pad

thereof. Rather, the description of Tong is limited to forming interconnections *after* material is applied to a wafer, initially cured, and the wafer is diced.

Claim 6, which depends from claim 5, is further allowable because Tong neither expressly nor inherently describes applying the protective material in a way that it contacts a base portion of a conductive structure.

Claim 7 depends from claim 6 and is further allowable since Tong does not expressly or inherently describe applying the protective material to form a support structure around the base portion of the conductive structure.

Claim 8, which also depends from claim 5, is further allowable as Tong lacks any express or inherent description of applying the protective material such that the protective material is spaced apart from a base portion of at least one conductive structure.

Claim 23 is further allowable since Tong contains no express or inherent description of healing the protective material while the polymer remains in a partially cured state.

Claim 24, which depends from claim 23, is further allowable because Tong does not expressly or inherently describe further curing the polymer following healing.

Claim 28 is further allowable because Tong includes no express or inherent description of healing the protective material by heating at least portions of the thermoplastic material located over peripheral regions of the adjacent semiconductor device components following severing and at least partially severing.

Withdrawal of the 35 U.S.C. § 102(e) rejections of each of claims 1-8 and 19-29 is respectfully solicited, as is allowance of these claims.

Rejections under 35 U.S.C. § 103(a)

Claims 9-18 stand rejected under 35 U.S.C. § 103(a) for reciting subject matter which is assertedly unpatentable over that taught in Tong in view of teachings from U.S. Patent 6,650,019 to Glenn et al. (hereinafter "Glenn").

The standard for establishing and maintaining a rejection under 35 U.S.C. § 103(a) is set forth in M.P.E.P. § 706.02(j), which provides:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Claims 9-18 are each allowable, among other reasons, for depending directly or indirectly from claim 1, which is allowable.

It is also respectfully submitted that the teachings of Tong and Glenn do not support a *prima facie* case of obviousness against any of claims 9-18.

In this regard, it is respectfully submitted that one of ordinary skill in the art wouldn't have had any reason to expect that teachings from Tong and Glenn could be combined in the asserted manner. This is because the semiconductor devices disclosed in Tong, which include semiconductor dice with protective layers on the active surfaces thereof and solder balls protruding through the protective layers, could not be used in the stacked assemblies of Glenn, which require that laterally extending conductive elements, such as leads, extend from between adjacently stacked semiconductor devices.

Further, it is respectfully submitted that one of ordinary skill in the art wouldn't have been motivated to use the leads of Glenn in place of the solder balls of Tong, as doing so would have required substantial changes to the process disclosed in Tong; *e.g.*, leads would have to be electrically connected to the devices after dicing, as the leads of Glenn extend beyond the peripheries of the devices to which they correspond, while epoxy would have to be applied to the devices after the dicing and positioning of the leads, as the leads must be electrically isolated from both the device to which they correspond and from an adjacent, stacked device.

In addition, it is respectfully submitted that Tong's teachings that relate to a B-stageable material that may be "cleanly diced" when B-staged amount to teaching away from a method in which a B-staged material is healed, as would be required for one of ordinary skill in the art to

have been motivated to combine teachings from Tong and Glenn in the manner that has been asserted.

It is also respectfully submitted that one of ordinary skill in the art wouldn't have any reason to expect the combined teachings of Tong and Glenn to result in the subject matter recited any of claims 9-18. In particular, since the teachings of Tong, which has been relied upon for purportedly teaching a healable B-stageable material, in fact relate to B-stageable materials that will not crack when diced (paragraph [0033]) and Glenn provides no teaching or suggestion with respect to healing a B-stageable material, one of ordinary skill in the art would have no reasonable expectation that any combination of teachings from these references could result in a method in which a B-staged material is healed.

For these reasons, it appears that one of ordinary skill in the art wouldn't have been motivated to combined teachings from Tong and Glenn in the asserted manner without the benefit of hindsight provided by the claims and disclosure of the above-referenced application.

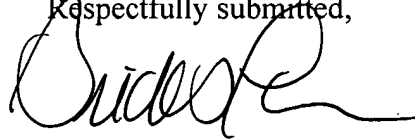
Therefore, is respectfully submitted that the asserted combination of teachings from Tong and Glenn does not support a *prima facie* case of obviousness against any of claims 9-18 of the above-referenced application.

Withdrawal of the 35 U.S.C. § 103(a) rejections of each of claims 9-18 is respectfully solicited, as is the allowance of these claims.

CONCLUSION

It is respectfully submitted that each of claims 1-29 is allowable. An early notice of the allowability of each of these claims is respectfully solicited, as is an indication that the above-referenced application has been passed for issuance. If any issues preventing allowance of the above-referenced application remain which might be resolved by way of a telephone conference, the Office is kindly invited to contact the undersigned attorney.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'Brick G. Power', written over the typed name.

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